I. C. 6511

JUNE, 1931

DEPARTMENT OF COMMERCE

UNITED STATES BUREAU OF MINES
SCOTT TURNER, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS

NO. XXVI

BY

FREDERICK W. LEE

I. C. 6511,
June, 1931.

INFORMATION CIRCULAR
DEPARTMENT OF COMMERCE -- BUREAU OF MINES

GEOPHYSICAL ABSTRACTS[1]

No. 26

Compiled by Frederick W. Lee[2]

Page
1. Gravitational methods.......... 137
2. Magnetic methods............... 141
3. Seismic methods................ 142
4. Electrical methods............. 145
5. Radioactive methods............ 151
6. Geothermal methods............. 153
7. Unclassified methods........... 154
9. New Books...................... 156
10. Patents....................... 156

List of contributing editors of Geophysical Abstracts:

Ayvazoglou, W., U.S. Bureau of Mines, Department of Commerce, Washington, D.C.
Barton, Dr. D. C., Petroleum Building, Houston, Tex.
Belluigi, Dr. Arnaldo, Corso Vittorio Emanuele 178, Parma, Italy.
Bogoiavlensky, Prof. L.,Central Chamber of Weights and Measures,Leningrad,U.S.S.R.
Eckhardt, Dr. E. A., 327 Craft Ave., Pittsburgh, Pa.
Eve, Dr. A. S., McGill University, Montreal, Canada.
Gish, Dr. O. H., Carnegie Institution, Broad Branch Road, Washington, D.C.
Gorsky, Eng. V., Allatini Mines, Ltd., Skoplie B.p. 134, Yugoslavia.
Hartley, Kenneth, 2404 San Jacinto St., Houston, Tex.
Hutchinson, Prof. W. Spencer, Mass. Institute of Technology, Cambridge, Mass.
Jenny, Dr. W. P., Magnolia Petroleum Co., Dallas, Tex.
Karcher, Dr. J. C., Dallas, Tex.
Keys, Dr. D. A., McGill University, Montreal, Canada.
Knappen, Dr. R. S., Gypsy Oil Co., Tulsa, Okla.
Korzujin, Prof. J., National University of Mexico, Mexico, D. F.
Lane, Prof. Alfred C., Tufts College, Boston, Mass.
Lee, Dr. F. W., U.S. Bureau of Mines, Department of Commerce, Washington, D.C.
Leonardon, E. C., 25 Broadway, New York City.
Numerov, Prof. Dr. B. V., Fontanka 34, Leningrad, U.S.S.R.
Petrowsky, A., Wasilly Ostrov, 21 Linia No. 8-A, Leningrad, U.S.S.R.
Roman, Dr. I., 90 Valley Way, West Orange, N. J.
Ruark, Dr. A. E., University of Pittsburgh, Pittsburgh, Pa.
Scholl, Louis A., Box 1805, Houston, Tex.
Shaw, Dr. H., The Science Museum, South Kensington, London, S.W. 7.
Sundberg, Dr.Karl, Swedish American Prospecting Corp.,26 Beaver St.,New York City.
Truemann, O. H., Humble Oil Co., Houston, Tex.
Van Orstrand, Dr. C. E., Interior Building, Washington, D. C.
von Weelden, Dr. A., Shell Petroleum Corp., Dallas, Tex.
Weaver, Paul, Drawer C, Houston, Tex.
Wright, Dr. F. E., Carnegie Institution, Washington, D. C.
Zuschlag, Dr.Theodor, Swedish American Prospecting Corp.,26 Beaver St.,New York Cit

---

[1] - The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6511."

[2] - Senior physicist, U. S. Bureau of Mines.

1. GRAVITATIONAL METHODS

(198) ÜBER ISOSTATISCHE SCHWEREANOMALIEN (ON ISOSTATIC GRAVITY ANOMALIES)

By Heinrich Jung

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 149-166.

This paper is a continuation of the author's article published in vol. 16, No. 3, 1930, of the Zeitschrift für Geophysik (see Geophys. Abs. 16). Jung examines here the relationship of the different gravity anomalies mentioned in the previous paper, using suitably chosen examples. The examples are selected in such a way that the most important typical cases are taken into consideration. The relationship which may be expected during the reduction of the observed gravity accelerations can be derived approximately from these examples, because the special local influences, by which the picture may be greatly changed, can in most cases be estimated and calculated.--W. Ayvazoglou.

(199) A NEW METHOD OF TOPOGRAPHICAL CORRECTION IN GRAVIMETRICAL PROSPECTING

By A. Belluigi and G. Lenzi

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 121-130.

There are many analytical and graphical methods for topographic correction. During the last few years they have further increased in number, although all of them offer different kinds of advantages and disadvantages in the computation of the gravimetric influence. A good graphic method must be easy to apply and the inevitable errors of the approximation must be kept within tolerable limits.

The authors hold that the methods published hitherto do not perfectly answer these requirements. Therefore the problem should be discussed in detail. On account of the given principles it is the best to assume polar coordinates in vertical planes. The authors believe this method to be particularly suitable for graphical and analytical development. The method mentioned is known already and quoted by different authors as Below's method.--Authors' abstract.

(200) DIE STOKESSCHE FORMEL IN DER GEODÄSIE ALS LÖSUNG EINER RANDWERTAUFGABE (STOKES' FORMULA IN THE GEODESY AS A SOLUTION OF A BOUNDARY-VALUE PROBLEM)

By N. Idelson and N. Malkin

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 156-160.

The fundamental formula of Stokes, giving the distance between the ellipsoid of reference and the geoid can be easily obtained as a solution of the third problem of the potential theory.--Authors' abstract.

(201) ZUR FRAGE NACH DEM ISOSTATISCHEN MASSENAUSGLEICH IN DER ERDRINDE

(CONTRIBUTION TO THE QUESTION OF THE ISOSTATIC COMPENSATION OF MASSES IN THE EARTHCRUST)

By A. Prey

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 201-225.

To decide the question raised by Hopfner, whether the isostasy is nothing but an illusion produced by the methods of reduction, a complete numerical investigation has been carried out for the case of a nonisostatic earth. Based on the author's development of the heights of the earth in spherical harmonics, the level surface (geoid) and the values of gravity on the surface of the continents and oceans have been computed. It was thereby taken into consideration that the heights were not to be counted from the surface of a normal earth but from the disturbed level surface. The free-air reduction and Bouguer's reduction were applied, as usual, to the values of gravity obtained in this manner.

It was shown that only in a few regions of the earth were the results of such a kind that an isostatic interpretation according to Hopfner was possible. In general the values of gravity on a nonisostatic earth did not agree with the observations. There was an obvious asymmetry in the north-south and in the east-west direction caused by the terms of the first order in the development. Accordingly, the values of gravity in America and Europe, if treated in the same manner, should differ by approximately $100 \cdot 10^{-3}$ cm./sec.^{2}, but this does not correspond to the observations. The absence of this difference seems to be a proof of the existence of a compensation of masses in the earth crust.--Author's abstract.

(202) CONCERNING GRAVIMETRICAL WORK IN CENTRAL ASIA (IN RUSSIAN)

By P. A. Savitsky

Department of Geological Prospecting in Central Asia, Tashkent, Information Bulletin 1, Aug., 1930, pp. 12-14.

A section of applied geophysics has recently been created at the Department of Geological Prospecting in Central Asia for the purpose of a systematic gravimetrical investigation of Central Asia. The investigation is proposed to be carried out in two directions:

1. General gravimetrical survey by pendulums.

2. Gravimetrical survey of single regions by means of gravitational variometers.

The necessity for this work becomes evident, taking into consideration the great importance of the region of Central Asia from the viewpoint of industry.—W. Ayvazoglou.

(203) DETERMINAZIONE GRAVIMETRICA DI INOMOGENEITA PROFONDE INCLUSE IN PIU ESTESE E DIVERSE INOMOGENEITA

(GRAVIMETRICAL DETERMINATION OF HETEROGENEOUS BODIES LYING AT DEPTH AND INCLUDED IN MORE EXTENSIVE BODIES OF VARIOUS HETEROGENEITIES)

By A. Belluigi

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 227-234.

The author examines the gravimetrical influence of an asymmetric anticlinal formation, lying at a depth, which extends in one direction to infinity, remains always in the same position, but has a nucleus or a cavity.

The density of a nucleus should be greater or less than that of the surrounding matter.

The author also suggests the possibility of establishing the reasons for the disturbance by making a graphic-analytical examination of the turning points observed in the profiles.—Author's abstract translated by W. Ayvazoglou.

(204) ÜBER DIE MITTEILUNG VON GRADIENTEN UND KRÜMMUNGSWERTEN UND DIE ANWENDUNG EINER UNDULATIONS-METHODE AUF SCHWERKRAFTMESSUNGEN

(CONCERNING THE MEAN OF GRADIENTS AND CURVATURE VALUES, AS WELL AS THE APPLICATION OF THE UNDULATION METHOD TO GRAVITY MEASUREMENTS)

By J. Koenigsberger

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 293-297.

To free the observed values of gradient and curvature from perturbations due to the inhomogeneity of the terrane and to instrumental errors, a set of every n (3 - 5) neighboring stations is tied together by a vector polygon; the resulting vector is divided by n. The center of the set is found like the center of gravity of n equal masses. The regional trend of the gradient of a larger area is found in the same way.

Notwithstanding the nondetermination of potential problems, it is possible to locate in the field the depth of border faces of hidden mass by the method of least undulations. A body in the earth does not have a wholly regular form; irregularities, holes, excrescences, channels, etc., of its border cause undulations in the isogams. The extension of an undulation - that is, the distance of half maximum values - is independent of the size of the irregularities and is given only by the depth of these irregularities under the surface of the earth, provided that the size of these irregularities is small ($\leqq 0.1$) as compared with their depth.

Only the amplitude of undulations varies with the size of the small irregularities. On account of disturbances by nonhomogeneities near the surface of the earth, it would be necessary to make some statistics of the extension of these undulations.--Author's abstract.

(205) INTERESTING TORSION BALANCE

Editorial note

The Petroleum World, London, vol. 28, No. 368, 1931, p. 146.

A modification of the Eötvös torsion balance is exhibited in the applied geophysics collection now on show at the Science Museum, South Kinsington. A description follows:

> The balance consists of a beam suspended by a fine torsion wire, carrying at its extremities two weights at different vertical heights and enclosed in a metal case which can be rotated about a vertical axis. The position of the brass box enclosing the balance arm is indicated by a horizontal circular scale, and the orientation of the arm relative to it is observed by the aid of a mirror fixed on the balance arm, and a telescope.
>
> In order to protect the balance adequately against all external effects which influence its action and equilibrium, it is completely enclosed in a double-walled brass case, the inner and outer walls being 2 mm. and 4 mm. thick, respectively, and separated by an air gap varying between 5 mm. and 10 mm. In this way the balance is protected against radiation, electrical influences, and eddy currents due to variation of temperature, and extreme sensitiveness is obtained.

--W. Ayvazoglou.

(206) A METHOD FOR DETERMINING THE DISTRIBUTION OF SUBTERRANEAN MASSES BY MEANS OF MAGNETIC AND GRAVIMETRIC OBSERVATIONS (IN RUSSIAN)

By G. Gamburtzeff

Journal of Applied Physics, Moscow, vol. 7, No. 2, 1930, pp. 103-105.

In this article Gamburtzeff describes a new method for interpreting magnetic and gravimetric observations by the utilization of optical effects produced by mixing colors. Diagrams serving for calculation of G_z - that is, of the vertical component of the anomalous value of the force of gravity - are discussed only. These diagrams are designed on transparent paper and different colors are applied to them; the amount of light penetrating through any square should be equal for each diagram. The images of several diagrams are then projected upon a screen so that their centers coincide with the most characteristic points (with respect to the curve ΔG_z) distributed along the line of observation (the latter must also be reproduced on the screen).

As the number of the squares included in the area sought for is known for each of the colored diagrams a certain summarized color can be composed for this area. After the mean color of the outline of the area is established, the finding of the area itself consists in finding on the screen an area having the same color. In order to obtain a summarized color for a certain area, an apparatus for the optical mixing of colors must be used. The form and position of the area can be determined by comparison of the colors. The results can be made exact and verified by means of a multigravimeter.—W. Ayvazoglou.

2. MAGNETIC METHODS

(207) THE GEOGRAPHICAL DISTRIBUTION OF MAGNETIC DISTURBANCE

By W. F. Wallis

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 36, No. 1, 1931, pp. 15-22.

A discussion at the Department of Terrestrial Magnetism of the magnetic results obtained by the two MacMillan arctic expeditions of 1921-22 and 1923-24, and a comparison of these results with those from several other stations, indicate that during magnetic storms the greatest disturbance occurs in the region of the zone of maximum auroral frequency, and that there is a close correlation between the curves of magnetic activity and auroral frequency when both are plotted in relation to magnetic latitude. A study of the propagation of different types of magnetic disturbance indicates that all types are not propagated with the same velocity. Possible causes of terrestrial magnetic disturbances are discussed.—Author's abstract.

(208) VARIATION OF HORIZONTAL-INTENSITY VARIOMETER SCALE VALUE WITH TEMPERATURE

By George Hartnell

Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 36, No. 1, 1931, pp. 29-32.

In a paper on horizontal-intensity variometers, the author developed the mathematical relations underlying the operation of horizontal-intensity variometers and showed how, in the case of quartz-filament suspension, the scale value may be controlled and compensation for temperature secured by use of suitably placed auxiliary magnets. Further development of the formulas shows that if too large a filament is used, change of temperature may have an appreciable effect on the scale value.--Author's abstract.

3. SEISMIC METHODS

(209) DIE ERDBEBEN FINLANDS

(FINLAND'S EARTHQUAKES)

By H. Renqvist

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 145-149.

This is an extract from Henrik Renqvist's work (Finnlands Jordskalv, Fennia LIV, No. 1, 113 pp., 13 figures and 16 tables, Helsingfors, 1930) written by E. Tams, in which the latter says that the thorough monographic work on earthquakes in Finland carried out by Renqvist furnishes a very manifold and stimulating contribution to the study of microseismic phenomena connected with earthquakes. The work is not of regional importance only, as in many respects the author discloses new methods; the question of the causes of Finland's earthquakes is examined with special elucidation.--W. Ayvazoglou.

(210) BODENERSCHÜTTERUNGEN, GEOPHYSIK UND INGENIEURGEOLOGIE

(GROUND VIBRATION, GEOPHYSICS, AND ENGINEERING GEOLOGY)

By Walter Kranz

Zeitschrift für Praktische Geologie, Halle (Salle), vol. 39, No. 3, 1931, pp. 38-40.

The author mentions that although there exists an extensive special literature on the use of practical geology for the technique of engineering in earthquake regions, the cooperation of geologists and engineers is not sufficient.

After a brief discussion of the necessity of constructing earthquake-proof buildings, Kranz concludes that, although no technical guarantee can be given against strong dislocations of the earth's crust during earthquakes, most of the damages and losses caused by natural and artificial earthquakes may be prevented by calculation and measurement in technical construction by close cooperation of geophysicists, geologists, and engineers.--W. Ayvazoglou.

(211) MÉTHODE SEISMIQUE DE PROSPECTION DU SOUS-SOL

(SEISMIC METHOD OF PROSPECTING THE SUBSOIL)

Editorial Note

L'Écho des Mines et de la Métallurgie, Paris, vol. 59, No. 3061, 1931, pp. 288-289.

This paper is an extract from Ch. Maurin's work, L'étude du sous-sol par les méthodes géophysiques.

Principles of seismic method are discussed. Acoustic, geothermal, and radioactive methods are mentioned. In conclusion, the author expresses a general desire for the creation, by the cooperation of all engaged in geophysical prospecting, of a geophysical atlas.--W. Ayvazoglou.

(212) NOTE ON THE MECHANISM OF THE NORTH IZU EARTHQUAKE OF NOVEMBER 26, 1930, IN JAPAN

By S. Fujiwhara and T. Takayama

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 131-137.

This is the preliminary note on the mechanism of a destructive earthquake which occurred on November 26, 1930, over North Izu in Japan. There appeared three or four systems of faults on this occasion, as shown in a figure. At first sight they are too complicated to be explained in any simple way. By a model experiment, however, the authors found that such complicated fault systems can quite naturally be produced by simple horizontal compressive stresses On assuming such stresses as existing in the actual case, the authors have succeeded in explaining the principal facts actually observed.—Author's abstract.

(213) À PROPOS D'UNE ONDE LONGUE DANS LA PREMIÈRE PHASE DE QUELQUES SEISMOGRAMMES

(CONCERNING ONE LONG WAVE APPEARING IN THE FIRST PHASE OF SOME SEISMOGRAMS)

By O. Somville

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 247-251.

This paper continues an article published by the author in Gerlands Beiträge zur Geophysik, vol. 27, No. 3-4, 1930 (see Geophys. Abs. 21, p. 9).

Since the publication of the first article Somville has obtained new observations on the PL-wave showing the data for the propagation of this wave beyond 1,400 kilometers. These data obtained by new observations are given in a table.

Another table shows the times of propagation for distances up to 2,400 kilometers.--W. Ayvazoglou.

(214) COLLECTION OF ARTICLES ON THE THEORY OF THE SEISMIC METHOD OF GEOLOGICAL PROSPECTING (IN RUSSIAN)

By P. T. Sokolov

Transactions of the Geological and Prospecting Service of the U.S.S.R., Leningrad, No. 17, 1931, 72 pp.

This pamphlet consists of a series of articles on seismic method of prospecting showing the results of Sokolov's work carried out during 1929 and 1930.

The following four problems are discussed:

1. Resolution of the hodograph function into series.
2. The methods for calculating the hodographs of waves caused by explosion.
3. Some suggestions concerning the theory of seismic prospecting.
4. Application of the seismic method to the measurement of the deviation of boreholes.

A definition of a hodograph is given as follows:

Based on the attainments of the present time seismic investigations, two quantities, mutually connected one with another, may be obtained in a simple and accurate way from the experiments. These two quantities are (a) the distance of the epicenter of the earthquake from the point of the outlet of the seismic wave at the surface of the earth, calculated along the great circle of the globe, and (b) the time of propagation of the wave from the epicenter to the outlet. The functional relationship of these two quantities is the "hodograph" and is represented symbolically by $T = T(\Delta)$, in which T is the time and Δ the distance of the epicenter from the outlet.

In the first article the author examines the general properties of a hodograph and the relationship of its coefficients to the elastic properties of the medium.

The second article deals with the methods of calculating the function of the hodograph. Two fundamental methods are compared: (1) the method of algebraic calculation from the velocities of waves in the environments under investigation, and (2) the method of trigonometric analysis of the optical angles of refraction and complete inner reflexion. The author is inclined to be in favor of the second method by reason of the ease of the calculations, the simplicity of the hodograph formulas and the convenience of interpretation. The author illustrates his conclusions by calculating hodographs for three beds with the boundaries inclined to one another.

In the third article the author discusses the problems of systems for carrying out the survey and of methods for combining the seismic data obtained for various profiles. This problem is considered to be important as, in order to obtain detailed and accurate results it is necessary to unite the single profiles, in some way, into one complete picture, thus introducing instead of seismic profiles one "seismic field."

In the fourth article the author, taking as a basis M. Malamphy's article, A Seismic Method of Determining the Deviation of Dull Holes (see Geophys. Abs. No. 4, p. 10), makes an attempt to justify the theory of the application of the seismic method to the measurement of the deviation of boreholes.--W. Ayvazoglou.

4. ELECTRICAL METHODS

(215) VORFÜHRUNG UND ERLÄUTERUNG EINES NEUEN MESSGERÄTS ZUR DIREKTEN AUSMESSUNG VON WIRBELSTROM FELDERN BEI GEOELEKTRISCHEN UNTERSUCHUNGEN

(PRESENTATION AND EXPLANATION OF A NEW MEASURING APPARATUS FOR THE DIRECT MEASUREMENT OF EDDY-CURRENT FIELDS DURING GEOELECTRICAL INVESTIGATIONS)

By P. Hülsenbeck

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 82, No. 9, 1930, p. 639.

A brief explanation of the new measuring apparatus was given at a meeting of the German Geological Society held on August 9, 1930. Photographic pictures of a series of results of measurements were presented, and it was shown how the deposits of better conductivity could be exactly distinguished, entirely independent of the position of these deposits with regard to the electrodes. Deposits with better conductivity produced eddy-current fields which were caught independently during the measurement. The difference in the pictures in case of different conductivity, depth, and thickness of the deposits was shown. It was explained how the voltage curve produced during a circular measurement was recorded by the measuring apparatus. The instrument is fixed inside of a water-tight box; all its movable parts can be manipulated from the outside so that measurements can be carried out also during a rain. By introducing the compensator into the box all the electrical connections are established automatically. The compensator is also provided with a water-tight tablet in which notes can be written. It was shown how easily the measuring apparatus can be operated.--W. Ayvazoglou.

(216) ÜBER GRÖSSE UND TIEFENWIRKUNG DER KAPAZITIVEN BEEINFLUSSUNG EINES LEITERS DURCH EINE DISHOMOGENITÄT DES UNTERGRUNDES. EIN REGISTRIERENDES MESSGERÄT

(ON THE VALUE AND DEPTH EFFECT OF THE CAPACITY INFLUENCE UPON A CONDUCTOR CAUSED BY A HETEROGENEITY IN THE SUBSOIL. A RECORDING MEASURING APPARATUS)

By W. Stern

Zeitschrift fur Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 166-174.

The value and sign of the change of capacity of a linear cylindrical conductor as a function of the distance from the heterogeneous body of electrical conductivity or the dielectric constant of its surroundings is examined in an experimental way. A recording measuring apparatus, developed for this purpose, by which a change of capacity equal to as much as $\pm 10^{-4}$ can be obtained, is described in detail.

It can be shown that the theoretical relationship which so far has formed the basis for the estimation does not satisfy the true conditions. An exact mathematical expression for the law on which the diagrams obtained are based has, of course, not been found so far. The maximum depth effect was established at 1 1/2 length of the conductor, thus can be considered to be about 150 meters.--Author's abstract translated by W. Ayvazoglou.

(217) DIE GLEICHZEITIGE ÜBERTRAGUNG VERSCHIEDENER SIGNALZEICHEN MIT EINEM EINFACHSENDER UND EMPFÄNGER

(SIMULTANEOUS TRANSMISSION OF DIFFERENT SIGNALS WITH ONE SINGLE-SENDER AND SINGLE-RECEIVER)

By J. N. Hummel and H. Witte

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 175-182.

The authors examine two connections by which a simultaneous transmission and registration by wireless of two different types of signals, independent one from another, is possible.

The article is divided in the following parts:

1. Definition of the problem (Problem-stellung).

2. Scheme of connection for overlapping receiving (Überlagerungsempfang).

3. Scheme of connection for receiving the current impulse (Stromstossempfang).

The scheme of sending and receiving arrangement, as well as the registrations of the signals are shown in figures.--W. Ayvazoglou.

(218) THEORETISCHE GRUNDLAGEN FÜR DIE ERFORSCHUNG DES ERDINNERN MITTELS GLEICHSTROM

(THEORETICAL FOUNDATION FOR INVESTIGATION OF THE INTERIOR OF THE EARTH BY MEANS OF DIRECT CURRENT)

By J. N. Hummel

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 182-190.

Taking into consideration that some methods used in applied geophysics for the discovery of ore deposits and the study of the tectonics of the uppermost layers may also be applied to scientific research of the physics of the body of the earth and especially because it has recently become possible to investigate by geoelectric methods the vertical change of the electrical conductivity at considerable depths, the author expresses the hope that electrical methods, after being developed further, may be applied for obtaining information on the interior of the earth.

In this article Hummel gives formulas for the measurement of the apparent specific resistance, pointing out that in case of investigation of great depths the curvature of the earth must be taken into consideration, and calculates the differences in values from those applied for plane surfaces.--W. Ayvazoglou.

(219) LA MÉTHODE DE LA CARTE DES RÉSISTIVITÉS ET SES APPLICATIONS PRATIQUES

(THE METHOD OF THE GROUND RESISTIVITY MAP AND ITS PRACTICAL APPLICATION)

By C. and M. Schlumberger

Annales des Mines, Paris, vol. 18, No. 9, 1930, pp. 97-124.

This article was presented by the authors at the International Congress of Mining, Metallurgy and Applied Geology held in Liège in June, 1930.

The article was published in the English language in the Canadian Mining and Metallurgical Bulletin 226, February, 1931, pp. 271-297 (see Geophys. Abs. 23, p. 73).--W. Ayvazoglou.

(220) ÜBER DIE BEZIEHUNGEN ZWISCHEN STÖRUNGEN DES KURZWELLENEMPFANGES UND DEN ERDMAGNETISCHEN STÖRUNGEN

(ON THE RELATIONSHIP BETWEEN THE DISTURBANCES OF THE SHORT-WAVE RECEPTION AND THE EARTHMAGNETIC DISTURBANCES)

By H. Mögel

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 207-212.

In this report Mögel shows, based on practical work, by what means of short-wave technique it is now possible to investigate, by making systematic experiments, the changes of the state of the Kennelly-Heaviside layer. After the report, means were discussed for attaining systematic cooperation in collecting results of observations carried out by the Transradio-Empfangsanlage Geltow near Potsdam and the observatory in Potsdam. The following two main questions were discussed in the report:

1. Proof of change of state of Kennelly-Heaviside layer by studying short-wave phenomena in case of normal variations, as well as in case of disturbances.

2. Observation of short-wave reception disturbances in the Transradio's receiving station across the ocean in connection with magnetic disturbances.

Five figures are added.--W. Ayvazoglou.

(221) DALL' UTILIZZAZIONE DEL RAPPORTO DELLE DISTRIBUZIONI DEI CAMPI POTENZIALE E ELETTROMAGNETICO ALLA DETERMINAZIONE DELLE CARATTERISTICHE DI PROFONDITA E POTENZA DEI GIACIMENTI NEI RELIEVI GEOELETTRICI

(ON THE USE OF THE RELATION OF THE DISTRIBUTION BETWEEN THE POTENTIAL AND ELECTROMAGNETIC FIELDS FOR THE DETERMINATION OF THE DEPTH AND POTENTIAL OF MINERAL LAYERS BY ELECTRICAL PROSPECTION)

By A. Belluigi

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 241-254.

In problems where the calculation of the depths of mineral layers is involved by electrical prospection, the first difficulties are encountered in ascertaining the planimetric dimensions of the layers themselves.

Even if it is true that the solutions which one is able to arrive at are not always perfectly correct, it is nevertheless possible to give solutions which are more or less correct.

In paragraphs 1, 2, and 3 the author illustrates the use of the relation of the distribution between potential and electromagnetic fields, especially fields with a nonelliptical structure.

The calculation of the depth can be carried out by the use of Biot-Savart's formula.--Author's abstract.

(222) ELEKTROGEOPHYSIKALISCHE FELDMESSUNGEN MIT NIEDERFREQUENTEM WECHSELSTROM

(ELECTRO-GEOPHYSICAL FIELD MEASUREMENTS WITH LOW FREQUENCY ALTERNATING CURRENT)

By Theo. Dieckmann

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 255-285.

The author describes the carrying out in a Devonian schistous region of a quantitative measurement of the distribution of intensity of a magnetic field interconnected with a low-frequency short-circuit earth current. The vertical component (H_z) of the magnetic field, the horizontal component (H_x) parallel to the line connecting the earth electrodes, and (H_y) perpendicular to this line, as well as the direction of the resulting magnetic vectors, were measured.

Diagrams of the distribution of the components resulting from the measurement of the inclination of the resulting vector and of the angle formed by the horizontal component of the magnetic field with the striking of the rock beds are given for a central line perpendicular to the line connecting the electrodes, which crosses the synclinal fold shown in section.

The distribution of the intensity of the magnetic field of the leading-in wire for various positions of the electrodes, as well as for any line running in a mountainous region, is shown in a series of tables. After the elimination of the magnetic field of the leading-in wire and after the introduction of a fundamental system, depending on the topography of the region, the curves of the distribution of intensity are found; they can serve as a basis for the evaluation because the eddy currents induced by the leading-in wire and the secondary currents induced by the primary field can be disregarded in making measurement with low-frequency alternating current.

The diagrams given in Figures 15, 16, and 17 (corresponding to Figures 5, 6, and 7) which show in addition to a magnetic field rotated in the H_x H_y plane, an inverted direction of the vertical component, H_z, illustrate the deformation of the disturbing field caused by the geological structure of the investigated region.— Author's abstract translated by W. Ayvazoglou.

(223) INTENSITÄTSGRADIENTEN BEI ELEKTRISCHEN AUFSCHLUSSVERFAHREN

(INTENSITY GRADIENTS IN THE ELECTRICAL METHOD OF EXPLORATION)

By Anton Graf

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 286-292.

Formulas for the intensity gradients of the magnetic alternating field artificially established by electrodes and ring senders are calculated, and attention is drawn to the advantage of the measurement of this value.--Author's abstract.

(224) PRINCIPLES OF THE SWEDISH GEOELECTRICAL METHODS

By Karl Sundberg

Ergänzungshefte für Angewandte Geophysik, Leipzig, vol. 1, No. 3, 1931, pp. 298-361.

This paper describes the theoretical principles upon which the Swedish geoelectrical methods are based and gives a summary of the most important practical results.

After a short account of the history of geophysical prospecting there follows a theoretical treatment of the electrical properties of the earth's crust, showing that content and composition of impregnated waters determine the electrical conductivity of rocks.

The geoelectrical methods are classified as potential methods, electromagnetic methods, and inductive methods, and the theory of each group of methods is treated. The importance of Lord Kelvin's theory of images for the comprehension of the potential methods is emphasized by several examples. The following two cases referring to inductive methods are fully treated mathematically:

1. Cylindrical conductor in homogeneous field, the axis of the cylinder being parallel to the field.

2. Horizontal layers with infinite horizontal extension. Principle as well as theory for electromagnetic methods constitutes a combination of potential and inductive methods. Numerous results of small-scale investigations illustrate the theoretical conclusions.

The influence of the magnetic properties is briefly treated.

The arrangements for the investigation of the electric and magnetic field are described and, finally, some practical results are briefly referred to, such as the discovery of the Boliden ore and other deposits in northern

Sweden, also deposits at Buchans, New Foundland, at Britannia, Canada, at Questa, U.S.A., and on Billiton, East Indies, as well as results of structural surveys in the Vienna Basin, Germany, and the United States of America.-- Author's abstract.

(225) A TWO-DIMENSIONAL BOUNDARY VALUE PROBLEM FOR THE TRANSMISSION OF ALTERNATING CURRENTS THROUGH A SEMI-INFINITE HETEROGENEOUS CONDUCTING MEDIUM

By Herbert P. Evans

The Physical Review, New York, vol. 36, No. 10, 1931, pp. 1579-1589.

In this paper an infinitely long conductor parallel to the surface of a semi-infinite conducting medium is considered. The medium is supposed to consist of an upper stratum of uniform conductivity σ_1, and having elsewhere a uniform conductivity σ_2. The conductor is supposed to carry an alternating current for which the conducting medium forms the return path. The problem under consideration is that of determining the field vectors throughout space, subject to the condition that the frequency is sufficiently low that displacement currents may be neglected. This problem has been solved by Haberland by the case of a sufficiently thin stratum, this limitation arising through the use of approximate boundary conditions. A solution has also been given by Carson for the case of a homogeneous medium. The present treatment utilizes exact boundary conditions and permits the stratum to be of any thickness. The boundary conditions are formulated for a function ϕ which satisfied the wave equation throughout space. By means of the conditions which must hold at the surface of the conductor and at the two faces of the stratum, together with the conditions at infinity, the function ϕ may be expressed in terms of an infinite integral from which the field vectors are derivable. This integral is expanded into a convergent series of simpler integrals which are given physical interpretation.-- Author's abstract.

5. RADIOACTIVE METHODS

(226) NEUERE UNTERSUCHUNGEN ÜBER HÖHENSTRAHLUNG

(NEW INVESTIGATIONS ON PENETRATING RADIATION)

By Werner Kolhörster

Zeitschrift für Geophysik, Braunschweig, vol. 7, No. 3/4, 1931, pp. 199-207.

This is a report delivered by Kolhörster at the meeting of the German Geophysical Association, held from September 11 to 14, 1930, in Potsdam, on the results of the research on penetrating radiation carried out during the last three years ending September, 1930.

The following items were discussed:

Instrumental improvements.
Problems of penetrating radiation (Höhenstrahlung)
Intensity measurments at various latitudes.
Intensity measurements at various altitudes.
Aperiodical intensity variations.
Intensity variations.
Periodical intensity variations.

Scientists working on the investigations of penetrating radiation and the results obtained by them are mentioned.--W. Ayvazoglou.

(227) GEGENFELDUNTERSUCHUNGEN UND BEWEGLICHKEITSMESSUNG KLEINER JONEN

(REACTION-FIELD INVESTIGATIONS AND MEASUREMENT OF THE MOBILITY OF SMALL IONS)

By T. Scholz

Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 226-238.

In one of his previous publications (Concerning the Method of Counting Ions in the Free-Air; see Geophys. Abs. 26) Yo Itiwara proved the existence of a "Gegenfeld" in the Langevin apparatus. It was desirable to establish whether the Gerdien and Ebert apparatuses also have such a "Gegenfeld." Measurements carried out on this subject at the Meteorological Observatory in Potsdam proved that this "Gegenfeld" existed and caused big error in the determination of the number of small ions. This error could be diminished by using grounded cylinders suspended inside of the condensers.

A strange behavior of the curves obtained from the measurements has been established; this probably may be used for the determination of the mobility of the small ions in an easier and more correct way than it was done previously.--Author's abstract.

(228) ÜBER DIE KONDENSATION AN VERSCHIEDENEN GROSSEN KONDENSATIONSKERNEN UND ÜBER DIE BESTIMMUNG IHRER ANZAHL

(ON THE CONDENSATION AT VARIOUS LARGE CONDENSATION NUCLEI AND ON THE DETERMINATION OF THEIR NUMBER)

By Hilding Köhler

Gerlands Beiträge zur Geophysik, Leipzig, vol. 29, No. 2, 1931, pp. 168-186.

Based on new investigations concerning the atmospheric ionization and the equilibrium of ionization in the atmosphere, the author brings up the question whether the number of nuclei obtained with Aitken's dustcounter is evidently correct. Thermodynamical considerations as well as experiences of the last years prove that this number is questionable.

Some meteorological phenomena are given as a proof of the investigations. These are:

1. A discontinuity of temperature gradient under or in the lower layers of a newly formed cloud.

2. The coexistence of layers of clouds at different altitudes.

3. An abrupt decrease of the atmospheric permeability before the formation of a layer of clouds.

4. The presence of nuclei in fog.

5. A decrease of concentration of chlorine in hoarfrost (Nebelfrost) with the altitude.—Author's abstract.

6. GEOTHERMAL METHODS

(229) GEOTHERMIC MEASUREMENTS NEAR SURFACE

By A. G. R. Whitehouse

The Colliery Guardian, London, vol. 142, No. 3655, 1931, pp. 210-211.

The object of the present observations was to study the relation of surface air temperature to earth temperature at depths up to 30 feet, and to examine the possibility of a more reliable datum for strata-temperature calculations.

The observations were made at Edgbaston in the grounds of the University of Birmingham at a point 453 feet above Ordnance Datum. The earth thermometers at depths of 1, 4, and 7 feet were in gravel, the 30-foot earth thermometer being in soft sandstone.

In Tables I and II are shown: Air and earth temperatures, annual means for the six years, 1924-1929; and annual ranges of temperature of the thermometers, respectively.

From the results of this investigation the author shows that change in mean earth temperature, with increasing depth near the surface, may be distinctly erratic, and that mean air temperature shows no general relationship to mean earth temperature near the surface. The author concludes that, therefore, the only practical datum in this country for calculations of geothermic gradient is the mean air temperature at the surface taken over a long range of years, and that this datum is at the best a very rough one.—W. Ayvazoglou.

7. UNCLASSIFIED METHODS

(230) ZUR KLÄRUNG TEKTONISCHER EINZELFRAGEN IM RHEINGEBIET MIT HILFE GEOPHYSIKALISCHER METHODEN

(CONTRIBUTION TO THE EXPLANATION OF PARTICULAR TECTONIC QUESTIONS IN THE RHINELAND WITH THE AID OF GEOPHYSICAL METHODS)

By R. Reichenbach

Zeitschrift der Deutschen Geologischen Gesellschaft, Berlin, vol. 82, No. 9, 1930, p. 633.

This is a brief report delivered by Reichenbach during the General Meeting of the German Geological Society held in Coblery from August 6 to 9, 1930.

He describes the results of three geophysical investigations carried out in the Rhineland.

1. Gravimetric measurements carried out in the Oberrhein-talgraben, to the south of Darmstadt, with the purpose of establishing the position of the border-faults and an approximate determination of the depth of the Graben.

2. Seismic measurements carried out in the Niederrheinischen Bucht between Rövenich and Liblar. Based on the results of a seismic profile the depth of the primitive rocks has been established at many places. The greatest depth, about 900 meters, has been reached near Liblar.

3. Radioactive measurements carried out near Hennef on the Sieg established and proved the position of a fault and of two ore lodes, the existence of which was already known.

The author concludes that the use of geophysical investigations may serve not only mining but also pure geology, as various problems may be explained by them.—W. Ayvazoglou.

(231) PLUMBING THE DEPTHS OF THE EARTH

By Kirtley F. Mather

Scientific Monthly, New York, February, 1931, pp. 165-168.

Plumbing the depths of the earth is a task of the greatest practical as well as scientific necessity, as many of the most fundamental questions, including the discovery of most valuable stores of petroleum and ore, can be answered only when the nature of the deeper interior of the earth is known. A brief explanation how seismic waves may serve for the determination of the elasticity and density of the material encountered by them is given.

Methods of geophysical prospecting (seismic, gravitational, magnetic) serving for plumbing the depths of the earth are discussed in general.—W. Ayvazoglou.

(232) GEOPHYSICAL SURVEYS

Editorial Note

Science, Philadelphia, vol. 73, No. 1893, 1931, pp. 383-384.

A report is given of a special exhibition of apparatus and equipment used in geophysical surveys opened in the Science Museum, South Kensington, London.

The exhibition begins with illustrating general magnetic principles, through specimens of William Gilbert's "terrella," or circular loadstone of data about 1600, to the most complicated present-time instruments.

Progress in gravitational and seismic methods of prospecting is shown in two other sections of the exhibition.—W. Ayvazoglou.

(233) GEOPHYSICS APPLIED TO MINING

By James Boyd

The Colorado School of Mines Magazine, Golden, vol. 21, No. 5, 1931, pp. 18 and 38-39.

After a brief introduction in which the author points out the necessity of close cooperation between the geologist and the geophysicist for obtaining successful results from a geophysical survey, the different methods of geophysical prospecting (gravitational, seismic, thermal, radioactive, magnetic, and electrical) and their advantages and disadvantages for various cases are discussed.—W. Ayvazoglou.

(234) PETROLEUM GEOPHYSICISTS NOW HAVE NATIONAL ORGANIZATION

By John F. Weinzierl

The Oil Weekly, Houston, Texas, vol. 61, No. 3, 1931, p. 60.

The Society of Petroleum Geophysicists, of which Dr. Donald C. Barton, Houston, is the president, came into being on May 20, 1930. Its object is to build up a reference library accessible to members and to serve as a place where the developments in instruments and the advancements in interpretive methods are to be discussed and criticized.

In 1930 the society published its first collection of papers, bound under a cover having the following title: The Society of Petroleum Geophysicists Publication of Papers Presented in 1930.—W. Ayvazoglou.

9. NEW BOOKS

(235) Peters, Leo J., and Bardeen, J. The solution of some theoretical problems which arise in electrical methods of geophysical exploration. Bulletin of the University of Wisconsin Engineering Experiment Station Series, No. 71, 85 pp., Madison, 1930. Price, 75 cents. The bulletin is illustrated with figures and graphs.

(236) Williams, Samuel Robinson. Magnetic phenomena. McGraw-Hill Book Co., New York, 1931, XXII and 230 pages. In the first chapter, Magnetomagnetics, dealing with the magnetic properties of substances, are discussed the definitions and laws and the mathematical and physical conceptions pertaining to magnetic properties, as well as the instruments and methods by which these properties are determined. The succeeding chapters on magnetomechanics, magnetoacoustics, magnetoelectrics, magnetothermics, magneto-optics, cosmical magnetism and magnetic theories and facts, discuss the effect of the magnetic properties upon other properties of substances.

10 PATENTS

1. GRAVITATIONAL METHODS

(237) GRAVITY-DETERMINING DEVICE

Richard Hammer, Pittsburgh, Pa.

United States patent 1,796,150 Patented March 10, 1931.

This invention relates to apparatus for determining variations in the force of gravity including a mass, means for mounting the mass for movement toward and away from the earth in response to change in gravity force, means for generating an alternating current of a predetermined high frequency, including means for varying such frequency by the movement of the mass, and means for measuring the frequency as varied.

Claims allowed - 1.

3. SEISMIC METHODS

(238) METHOD OF RECORDING SEISMIC WAVES

Henry Gordon Taylor, Beaumont, Tex.
Assignor to Geophysical Exploration Co. of Beaumont,
Texas, a corporation of Delaware.

United States patent 1,799,398. Patented Apr. 7, 1931.

The invention relates to a method for ascertaining the presence, depth, shape, and disposition of subsurface strata and other geologic structure.

The general object of this invention consists of providing a method by which a reflected wave is more strongly recorded on a seismogram, and by which other waves are partly or wholly eliminated from the seismogram, making it thereby possible to measure with certainty the time required for an artificially created seismic wave to travel from the surface of the earth down to a reflecting discontinuity and back to the surface, from which data the distance to the reflecting discontinuity may be computed.

Claims allowed - 25.

4. ELECTRICAL METHODS

(239) APPARATUS FOR USE IN DISCOVERING AND DETERMINING OREBODIES

Etienne Samuel Bieler and Horace George Isbister Watson,
of Montreal, Quebec, Canada.

United States patent 1,794,666 Patented March 3, 1931.

The principal feature of this invention is the provision of two flat coils of wire permanently fixed at right angles to each other, but which may be tilted and turned in any desired direction so as to obtain the desired information relative to the location of any orebody in the vicinity.

Claims allowed - 3.

INDEX[3]

Page

Bardeen, J. (235, 9) 156
Belluigi, A. (199, 1) 137
____________ (203, 1) 139
____________ (221, 4) 148
Bieler, Etienne Samuel (239, 10) 157
Boyd, James (233, 7) 155

Diekmann, Theo (222, 4) 149

Écho des Mines et de la Métallurgie (Editorial Note) (211, 3) 142
Evans, Herbert P. (225, 4) 151

Fijiwhara, S. (212, 3) 143

Gamburtzeff, G. (206, 1) 140
Graf, Anton (223, 4) 150

Hammer, Richard (237, 10) 156
Hartnell, George (208, 2) 141
Hülsenbeck, P. (215, 4) 145
Hummel, J. N. (217, 4) 146
____________ (218, 4) 147

Idelson, N. (200, 1) 137

Jung, Heinrich (198, 1) 137

Koenigsberger, J. (204, 1) 139
Köhler, Hilding (228, 5) 152
Kolhörster, Werner (226, 5) 151
Kranz, Walter (210, 3) 142

Lenzi, G. (199, 1) 137

Malkin, N. (200, 1) 137
Mather, Kirtley F. (231, 7) 154
Mögel, H. (220, 4) 148

Peters, Leo J. (235, 9) 156
Petroleum World, The (Editorial Note) (205, 1) 140
Prey, A. (201, 1) 138

---

[3] - The first figure refers to the number of the abstract, the second to the method of prospecting as indicated in the table of contents, and the third to the page.

Page

Reichenbach, R. (230, 7) 154
Renqist, Henrik, (209, 3) 142

Savitsky, P. A. (202, 1) 138
Schlumberger, C. (219, 4) 147
Schlumberger, M. (219, 4) 147
Scholz, J. (227, 5) 152
Science (Editorial Note) (232, 7) 155
Sokolov, P. T. (214, 3) 144
Stern, W. (216, 4) 146
Somville, O. (213, 3) 143
Sundberg, Karl (224, 4) 150

Takayama, T. (212, 3) 143
Taylor, Henry Gordon (238, 10) 157

Wallis, W. F. (207, 2) 141
Watson, Horance George Isbister (237, 10) 157
Weinzierl, John F. (234, 7) 155
Whitehouse, A. G. R. (229, 6) 153
Williams, Samuel Robinson (236, 9) 156
Witte, H. (217, 4) 146